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B 324,331,342,344,347,348,349,350,351,352,371

>>> 350 is unauthorized

>>> 351 is unauthorized

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>>>3 of the specified files are not available

28oct06 11:57:08 User264717 Session D517.1

\$0.00 0.195 DialUnits FileHomeBase

\$0.00 Estimated cost FileHomeBase

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\$0.22 Estimated total session cost 0.195 DialUnits

SYSTEM:OS - DIALOG OneSearch

File 324:German Patents Fulltext 1967-200642

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***File 324: For important information about IPCR/8 and forthcoming changes to the IC= index, see HELP NEWS IPCR.**

File 331:Derwent WPI First View UD=200669 (c) 2006 The Thomson Corp.

***File 331: For patent family information, search also File 351, 352, or 350.**

File 342:Derwent Patents Citation Indx 1978-05/200666

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File 344:Chinese Patents Abs Jan 1985-2006/Jan

(c) 2006 European Patent Office

File 347:JAPIO Dec 1976-2006/Jan(Updated 061009)

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File 348:EUROPEAN PATENTS 1978-2006/ 200643

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File 349:PCT FULLTEXT 1979-2006/UB=20061026UT=20061019

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***File 349: For important information about IPCR/8 and forthcoming changes to the IC= index, see HELP NEWSIPCR.**

File 371:French Patents 1961-2002/BOPI 200209

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*File 371: This file is not currently updating. The last update is 200209.

| Set | Items | Description |
|-----|-------|-------------|
| --- | ----- | ----- |

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S (DETERMIN? OR COMPUT? OR CALCULAT?) (S) (VELOCITY (S) (WHEEL (2N) DRIV?) (S) (REFE
Processing

>>>File 348 processing for COMPUT? stopped at COMPUTERSTEUERMITTEI
Processing

>>>File 349 processing for DETERMIN? stopped at DETERMININGFOR

>>>File 349 processing for COMPUT? stopped at COMPUTERMAUSTASTEN

>>>File 349 processing for DRIV? stopped at DRIVIRIAR
Processing

2242562 DETERMIN?

1238935 COMPUT?

931412 CALCULAT?

227307 VELOCITY

530089 WHEEL

2485384 DRIV?

2418801 REFERENC?

1648591 DISTANC?

1122107 VEHICLE

S1 1 (DETERMIN? OR COMPUT? OR CALCULAT?) (S) (VELOCITY (S)
(WHEEL (2N) DRIV?) (S) (REFERENC? (2N) DISTANC?) (S)
VEHICLE)

?

T S1/3,KWIC/1

1/3,KWIC/1 (Item 1 from file: 349)

DIALOG(R)File 349:PCT FULLTEXT

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00926927 **Image available**

SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE

SYSTEME ET PROCEDE DE DIRECTION D'UN VEHICULE A ROUES MOTRICES MULTIPLES

Patent Applicant/Assignee:

INVACARE CORPORATION, One Invacare Way, Elyria, OH 44036-2125, US, US
(Residence), US (Nationality)

Inventor(s):

STROTHMANN Thomas, Noldestrabe 3, 49134 Wallenhorst, DE,

Legal Representative:

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Investment Center, 800 Superior Avenue, Cleveland, OH 44114, US,

Patent and Priority Information (Country, Number, Date):

Patent: WO 200260742 A2-A3 20020808 (WO 0260742)

Application: WO 2002US952 20020115 (PCT/WO US0200952)

Priority Application: US 2001773793 20010201

Designated States:

(Protection type is "patent" unless otherwise stated - for applications
prior to 2004)

AU CA NZ

(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR

Publication Language: English

Filing Language: English

Fulltext Word Count: 5651

Fulltext Availability:

Detailed Description

Claims

English Abstract

A system and method of controlling a multi-wheel drive vehicle is provided. The invention is preferably applicable to the steering of such a vehicle and determines the individual velocities for each wheel drive (108, 110, 112, 114). In this regard, the invention includes two general steps. The first step includes determining the distance of each wheel drive (108, 110, 112, 114) and a vehicle velocity reference point from a turning reference point. The second step includes ratioing each wheel drive 's distance from the turning reference point with the vehicle velocity reference point's distance from the turning reference point. The ratios are then applied to a vehicle velocity associated with the vehicle velocity reference point to determine the velocity of each respective wheel drive (108, 110, 112, 114). Once determined, the velocities are output to each wheel drive (108, 110, 112, 114).

Detailed Description

... to another embodiment of the present invention, a method of controlling a multi-wheel drive vehicle includes, for example, the step of determining a turning reference, vehicle velocity, and reference distance. The reference distance is the distance between the turning reference and a known reference position relative to the vehicle. The method further includes, for example, determining a wheel drive distance and velocity for each wheel drive. The wheel drive distance is the distance of each wheel drive from the turning reference. The velocity for a wheel drive is determined from the wheel drive distance, reference distance and vehicle velocity. Once the velocity for each wheel drive has been determined, it is outputted to each wheel drive.

[0061] According to another embodiment of the present invention a system for...third point "R" exists laterally between wheel drives 112 and 114 and spatially defines the vehicle 's velocity reference point. The steering servo-mechanism 116 is mechanically coupled to the rear...

...in terms of an angle θ , as shown. The angle θ is used to determine the turning reference position in distance a between turning reference point "P" and point "O", as shown in Figure 2. This determination is made via Equation (1).

$$a = HR \times \tan(\theta) \quad \text{Eq. (1)}$$

where, θ is... $X \cot(\theta) = HR \cot(\theta)$ Eq. (2)

[0051] Having defined the turning reference distance a and the wheel base positions, reference is now made to Figure 3. Figure 3 illustrates distances S from turning reference point "P" to each wheel drive and the velocities V of each wheel drive. In this regard, logic 104 employs either of two approaches to determine the individual wheel drive velocities. The first approach utilizes a two step analysis wherein the first step is to determine, from turning reference point "Y", the distance of each of the wheel drives and the vehicle 's velocity reference point "W".

Once these distances are known, the individual wheel drive velocities can be determined based on the known velocity at the vehicle 's velocity reference point "W" and the wheel drive 's distance from turning reference point "Y". The second approach utilizes the steering servomechanism's 116 angular position and the vehicle 's wheel drive

base dimensions.

[O 02 61 Referring now to Figure 3, the present discussion will now...

...112, and 114, respectively, and turning reference point "P." Distance SR represents the distance between vehicle 's velocity reference point "W" and turning reference point "P." So defined, these distances can be determined according to Equations (3)-(7).

SFL = a - w Eq. (3)

2

W

SFR=a+- Eq...

...X VR for 0 P Z Eq. (14)

SR

Generally, Equations (9)-(14) determine each wheel drive 's velocity V by ratioing each wheel drive distance S with the vehicle 's velocity reference point distance SR and then applying that ratio to the vehicle velocity VR designated at the vehicle velocity reference point "R". Hence, by determining the individual wheel drive distances, the individual wheel drive velocities can be determined therefrom.

[00281 Still referring to Figure 3, the second approach described above utilizes the steering...The logic starts in step 402 where the logic reads the angularpositionpofstecringservo-mechaiiism116.

The logic next advances to step 404 where the reference distance a, individual wheel drive distances S, and vehicle velocity reference point distance SR are determined via equations (1) and (3)-(7), respectively. After step 404, the logic advances to step 406 where the velocities for each wheel drive are determined based on each wheel drive 's distance S, the vehicle velocity reference point distance SR, the overall vehicle velocity VR, and anglefl. (See, for example, Figure 3 and Equations (8)-(14)). After all of the wheel drive velocities have been determined, they are output in step 408 to the wheel drives.

After stop 408, the logic loops back to step 402 and the logic repeats. It...

...effecting movement of the vehicle.

10

[O 03 21 hi surnmary, 'by det6nnining the individual wheel drive velocities for a mult- wheel drive vehicle, accurate turns may be taken by the vehicle that do not cause oversteer, understeer, or any of the wheel drives to drag along the riding surface. The velocities can be deterinined by either of two approaches. The first approach generally utilizes a two step analysis. The first step determines the distance of each wheel drive from a turning reference point. Once the distances have been determined, the velocities are determined in a second step by ratioing the wheel drive distance from the turning reference point and the vehicle 's velocity reference point distance from the turning point and applying that ratio to the vehicle velocity. The second approach utilizes the steering servo-mechanism's angular position and the vehicle 's wheel drive base dimensions, along with the vehicle velocity, to determine the individual wheel drive velocities. Once all of the individual wheel drive velocities have been determined, they are applied to the wheel drives.

Moreover, for individually stecrable wheel drives, the steering angle can

be detennined through the wheel...

Claim

... general inventive concept.

CLAIMS: I claim:

1 A method of controlling a multi-wheel drive vehicle comprising the steps of:
 (a) detennining a turning reference and a vehicle velocity ;
 (b) determining a reference distance from the turning reference;
 (c) determining a wheel drive distance ftorn. the turning reference for each wheel drive of the multi- wheel drive vehicle ;
 (d) detennining a velocity for each wheel drive based on the vehicle velocity , wheel drive distance , and reference distance ; and
 (e) outputting the determined velocity for each wheel drive to each wheel drive .

2 The method of claim 1 wherein step (a) comprises reading the position output of...

...steering servo-mechanism.

6 The method of claim 1 wherein step (b) comprises determining the reference distance based on the following relationship:

$$SR = la^2 + H^2$$

where SR is the reference distance , a is the turning reference, and H is a wheel base dimension of the vehicle .

12

. The method of claim 1 wherein step (d) comprises determining the velocity for each

wheel drive based on the following relationship:

$$V = S \times VP$$

SR

where V is the velocity for the wheel drive , S is the wheel drive distance from the taming reference, SR is the reference distance , and VR is the vehicle velocity .

8 The method of claim 1 flifther comprising the step of determining a steering angle...

...steering angle to the at least one drive.

10 A system for controlling a multi- wheel drive vehicle comprising the steps of:

(a) an input device;
 (b) a controller in circuit communication with the input device;
 (c) at least two wheel drives in circuit communication with the controller; and
 (d) logic for:
 (1) determining a turning reference and a vehicle velocity from the input device;
 (2) determining a reference , distance from the turning reference;
 (3) detern-iining a wheel drive distance from the turning reference for each wheel drive of the multi- wheel drive vehicle ;
 (4) deterinining a velocity for each wheel drive based on the vehicle velocity ,

wheel drive distance , and reference distance ; and
(5) outputting the determined velocity for each wheel drive to each wheel drive .

11 The system of claim 10 wherein the input device comprises a user manipulable input...

...The system of claim 10 wherein the logic for determining a velocity for each wheel drive based on the vehicle velocity , wheel drive distance , and reference distance comprises logic for determining the velocity for each wheel drive based on the following relationship:

$$V = S \times VR$$

SR

where V is the velocity for the wheel drive , S is the wheel drive distance from the turning reference, SR is the reference distance , and VR is the vehicle velocity .

17 The method of claim 10 further comprising logic for determining a steering angle for...

...steering angle to the at least one drive.

14

. A system for controlling a multi- wheel drive vehicle comprising the steps of

(a) means for inputting at least one control signal;

(b) a...

...communication with the means for inputting a

plurality of control signals;

(c) at least two wheel drive means in circuit communication with the controller

means;

(d) means for determining a turning reference and a vehicle velocity from the input

device-,

(e) means for determining a reference distance from the turning reference; (f) means for determining a wheel drive distance from the turning reference for each

wheel drive of the multi- wheel drive vehicle ;

(g) means for determining a velocity for each wheel drive based on the vehicle

velocity , wheel drive distance , and reference distance ; and

(h) means for outputting the determined velocity for each wheel drive to each wheel drive .

20 The system of claim 19 wherein the means for inputting at least one control...

...25 The system of claim 19 wherein the means for determining a velocity for each wheel drive based on the vehicle velocity , wheel drive distance , and reference distance comprises means for determining the velocity for each wheel drive based on the following relationship:

$$V = S \times VR$$

SR

where V is the velocity for the wheel drive , S is the wheel drive distance from the turning reference, SR is the reference distance , and VR is the vehicle velocity .

26 The method of claim 19 further comprising the logic for determining a

steering angle...
?

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File 6:NTIS 1964-2006/Oct W3

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File 8:EI Compendex(R) 1970-2006/Oct W3

(c) 2006 Elsevier Eng. Info. Inc.

File 25:Weldasearch 1966-2006/Sep

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File 36:MetalBase 1965-20061026

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File 65:Inside Conferences 1993-2006/Oct 27

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File 266:FEDRIP 2006/Aug

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| Set | Items | Description |
|-----|-------|--|
| S1 | 0 | PD<=010201 AND (DETERMIN? OR COMPUT? OR CALCULAT?) (S) (V- ELOCITY (S) (WHEEL (4N) DRIV?) (S) (REFERENC? (4N) DISTANC?) - (S) VEHICLE) |
| S2 | 0 | (DETERMIN? OR COMPUT? OR CALCULAT?) (S) (VELOCITY (S) (WHE- EL (4N) DRIV?) (S) (REFERENC? (4N) DISTANC?) (S) VEHICLE) |
| ? | | |

S PD<=010201 AND (DETERMIN? OR COMPUT? OR CALCULAT?) (S) (VELOCITY (S) (WHEEL (4N)
)

>>>One or more prefixes are unsupported

>>> or undefined in one or more files.

>>>File 25 processing for PD= : PD=010201

>>> started at PD=19080000 stopped at PD=19920106

>>>File 63 processing for PD= : PD=010201

>>> started at PD=DATED stopped at PD=19680517

>>>File 81 processing for PD= : PD=010201

>>> started at PD=19390728 stopped at PD=19920325

Processing

1354615 PD<=010201

1984088 DETERMIN?

3316820 COMPUT?

1291155 CALCULAT?

530937 VELOCITY

69709 WHEEL

592048 DRIV?

685697 REFERENC?

313419 DISTANC?

381194 VEHICLE

0 ((DETERMIN? OR COMPUT?) OR
 CALCULAT?) (S) VELOCITY (S) WHEEL (4N) DRIV? (S) REFERENC? (4N) DI-
 STANC? (S) VEHICLE

S1 0 PD<=010201 AND (DETERMIN? OR COMPUT? OR CALCULAT?) (S)
 (VELOCITY (S) (WHEEL (4N) DRIV?) (S) (REFERENC? (4N)
 DISTANC?) (S) VEHICLE)

files uspatfu 340-341

| Set | Items | Description |
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| S2 | 6 | ((COMPUT? OR DETERMIN? OR CALCULAT?) (S) VEHICLE (S) VELOCITY (S) (REFEREN? (2N) DISTANC?) (S) (WHEEL (2N) DRIV?)) |
| S3 | 6 | ((COMPUT? OR DETERMIN? OR CALCULAT?) (S) VEHICL? (S) VELOCITY (S) (REFEREN? (2N) DISTANC?) (S) (WHEEL? (2N) DRIV?)) |

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    477060 VEHICLE
    165956 VELOCITY
    508964 REFEREN?
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    280498 WHEEL
    1299346 DRIV?
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          CALCULAT?) (S) VEHICLE (S) VELOCITY (S) REFEREN? (2N) DISTANC? (S-
          ) WHEEL (2N) DRIV?
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          (WHEEL (2N) DRIV?))
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3/3,IN/1 (Item 1 from file: 340)
 DIALOG(R) File 340:CLAIMS(R)/US Patent
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10679394

E/SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE
 Inventors: Strothmann Thomas (DE)
 Assignee: Unassigned Or Assigned To Individual
 Assignee Code: 68000
 Attorney, Agent or Firm: CALFEE HALTER & GRISWOLD, LLP, 800 SUPERIOR
 AVENUE, SUITE 1400, CLEVELAND, OH, 44114, US

| | Publication Number | Kind | Date | Application Number | Date |
|------------------|-----------------------|------|----------|-----------------------|----------|
| | US 20040186633 | A1 | 20040923 | US 2004815308 | 20040401 |
| Continuation of: | US 6526336 | | | US 2001773793 | 20010201 |
| | Pending | | | US 2002279606 | 20021024 |
| Priority Applic: | | | | US 2004815308 | 20040401 |
| | | | | US 2001773793 | 20010201 |
| | | | | US 2002279606 | 20021024 |

3/3,IN/2 (Item 2 from file: 340)
 DIALOG(R) File 340:CLAIMS(R)/US Patent
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04146083

E/(A1) SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE
(B2) SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE
 Inventors: Strothmann Thomas (DE)
 Assignee: (A1) Unassigned Or Assigned To Individual
 (B2) Invacare Corp
 Assignee Code: (A1) 68000; (B2) 37783
 Probable Assignee: Invacare Corp
 Attorney, Agent or Firm: Calfee, Halter & Griswold; Pejic, Nenad

| | Publication Number | Kind | Date | Application Number | Date |
|--------------------|-----------------------|------|----------|-----------------------|----------|
| | US 20030055539 | A1 | 20030320 | US 2002279606 | 20021024 |
| | US 6807466 | B2 | 20041019 | US 2002279606 | 20021024 |
| Continuation of: | US 6526336 | | | US 2001773793 | 20010201 |
| Prior Publication: | US 20030055539 | A1 | 20030320 | | |
| Priority Applic: | | | | US 2002279606 | 20021024 |
| | | | | US 2001773793 | 20010201 |

Calculated Expiration: 20210201

3/3,IN/3 (Item 3 from file: 340)
 DIALOG(R) File 340:CLAIMS(R)/US Patent
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3836244

E/(A1) SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE
(B2) SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE
 Inventors: Strothmann Thomas (DE)
 Assignee: (A1) Unassigned Or Assigned To Individual
 (B2) Invacare Corp
 Assignee Code: (A1) 68000; (B2) 37783

Probable Assignee: Invacare Corp
 Attorney, Agent or Firm: Calfee, Halter & Griswold LLP; Pejic Nenad

| | Publication Number | Kind | Date | Application Number | Date |
|------------------------|-----------------------|------|----------|-----------------------|----------|
| | US 20020147539 | A1 | 20021010 | US 2001773793 | 20010201 |
| | US 6526336 | B2 | 20030225 | US 2001773793 | 20010201 |
| Prior Publication: | US 20020147539 | A1 | 20021010 | | |
| Priority Applic: | | | | US 2001773793 | 20010201 |
| Calculated Expiration: | 20210201 | | | | |

3/3,IN/4 (Item 1 from file: 341)
 DIALOG(R) File 341:CLAIMS(R)/UNITERM
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10679394

E/SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE
 Inventors: Strothmann Thomas (DE)
 Assignee: Unassigned Or Assigned To Individual
 Assignee Code: 68000
 Attorney, Agent or Firm: CALFEE HALTER & GRISWOLD, LLP, 800 SUPERIOR
 AVENUE, SUITE 1400, CLEVELAND, OH, 44114, US

| | Publication Number | Kind | Date | Application Number | Date |
|------------------|-----------------------|------|----------|-----------------------|----------|
| | US 20040186633 | A1 | 20040923 | US 2004815308 | 20040401 |
| Continuation of: | US 6526336 | | | US 2001773793 | 20010201 |
| | Pending | | | US 2002279606 | 20021024 |
| Priority Applic: | | | | US 2004815308 | 20040401 |
| | | | | US 2001773793 | 20010201 |
| | | | | US 2002279606 | 20021024 |

3/3,IN/5 (Item 2 from file: 341)
 DIALOG(R) File 341:CLAIMS(R)/UNITERM
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04146083

E/(A1) SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE
(B2) SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE
 Inventors: Strothmann Thomas (DE)
 Assignee: (A1) Unassigned Or Assigned To Individual
 (B2) Invacare Corp
 Assignee Code: (A1) 68000; (B2) 37783
 Probable Assignee: Invacare Corp
 Attorney, Agent or Firm: Calfee, Halter & Griswold; Pejic, Nenad

| | Publication Number | Kind | Date | Application Number | Date |
|------------------------|-----------------------|------|----------|-----------------------|----------|
| | US 20030055539 | A1 | 20030320 | US 2002279606 | 20021024 |
| | US 6807466 | B2 | 20041019 | US 2002279606 | 20021024 |
| Continuation of: | US 6526336 | | | US 2001773793 | 20010201 |
| Prior Publication: | US 20030055539 | A1 | 20030320 | | |
| Priority Applic: | | | | US 2002279606 | 20021024 |
| | | | | US 2001773793 | 20010201 |
| Calculated Expiration: | 20210201 | | | | |

3/3,IN/6 (Item 3 from file: 341)
DIALOG(R)File 341:CLAIMS(R)/UNITERM
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3836244

E/(A1) SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE
(B2) SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE
Inventors: Strothmann Thomas (DE)
Assignee: (A1) Unassigned Or Assigned To Individual
(B2) Invacare Corp
Assignee Code: (A1) 68000; (B2) 37783
Probable Assignee: Invacare Corp
Attorney, Agent or Firm: Calfee, Halter & Griswold LLP; Pejic Nenad

| | Publication Number | Kind | Date | Application Number | Date |
|------------------------|-----------------------|------|----------|-----------------------|----------|
| | US 20020147539 | A1 | 20021010 | US 2001773793 | 20010201 |
| | US 6526336 | B2 | 20030225 | US 2001773793 | 20010201 |
| Prior Publication: | US 20020147539 | A1 | 20021010 | | |
| Priority Applic: | | | | US 2001773793 | 20010201 |
| Calculated Expiration: | 20210201 | | | | |

10/815308

| Set | Items | Description |
|-----|-------|---|
| S1 | 6 | (DETERMIN? OR CALCULAT? OR COMPUT?) (2N) (VELOCITY (2W) WH- EEL) (S) ((WHEEL (2W) DISTANCE) (S) (REFERENCE (2W) DISTANCE)) |
| ? | | |

T S1/3,KWIC/1-6

1/3,KWIC/1 (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00926927 **Image available**

SYSTEM AND METHOD FOR STEERING A MULTI-WHEEL DRIVE VEHICLE
SYSTEME ET PROCEDE DE DIRECTION D'UN VEHICULE A ROUES MOTRICES MULTIPLES
Patent Applicant/Assignee:

INVACARE CORPORATION, One Invacare Way, Elyria, OH 44036-2125, US, US
(Residence), US (Nationality)

Inventor(s):

STROTHMANN Thomas, Noldestrabe 3, 49134 Wallenhorst, DE,

Legal Representative:

PEJIC Nenad (agent), Calfee, Halter & Griswold LLP, 1400 McDonald
Investment Center, 800 Superior Avenue, Cleveland, OH 44114, US,

Patent and Priority Information (Country, Number, Date):

Patent: WO 200260742 A2-A3 20020808 (WO 0260742)

Application: WO 2002US952 20020115 (PCT/WO US0200952)

Priority Application: US 2001773793 20010201

Designated States:

(Protection type is "patent" unless otherwise stated - for applications
prior to 2004)

AU CA NZ

(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR

Publication Language: English

Filing Language: English

Fulltext Word Count: 5651

Fulltext Availability:

Detailed Description

Claims

Detailed Description

... drive vehicle includes, for example, the step of determining a turning reference, vehicle velocity, and reference distance. The reference distance is the distance between the turning reference and a known reference position relative to the vehicle. The method further includes, for example, determining a wheel drive distance and velocity for each wheel drive. The wheel drive distance is the distance of each wheel drive from the turning reference. The velocity for a wheel drive is determined from the wheel drive distance, reference distance and vehicle velocity. Once the velocity for each wheel drive has been determined, it is...

Claim

... the steps of:

- (a) determining a turning reference and a vehicle velocity;
- (b) determining a reference distance from the turning reference;
- (c) determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle;
- (d) determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance; and
- (e) outputting the determined velocity for each wheel drive to each wheel drive.

2 The method of claim 1 wherein step (a) comprises...

...steering servo-mechanism.

6 The method of claim 1 wherein step (b) comprises determining the reference distance based on the following relationship:

$$SR = \frac{1}{2} a^2 + H^2$$

where SR is the reference distance, a is the turning reference, and H is a wheel base dimension of the vehicle.

12

. The method of claim 1 wherein step (d) comprises determining the velocity for each

wheel drive based on the following relationship:

$$V = S \times VP$$

SR

where V is the velocity for the wheel drive, S is the wheel drive distance from the turning reference, SR is the reference distance, and VR is the vehicle velocity.

8 The method of claim 1 further comprising the...

...determining a turning reference and a vehicle velocity from the input device;

(2) determining a reference distance from the turning reference;

(3) determining a wheel drive distance from the turning reference for each

wheel drive of the multi-wheel drive vehicle;

(4) determining a velocity for each wheel drive based on the vehicle velocity,

wheel drive distance, and reference distance; and

(5) outputting the determined velocity for each wheel drive to each wheel drive.

11 The system of claim 10 wherein the input device...

...dimension of the vehicle.

16 The system of claim 10 wherein the logic for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance comprises logic for determining the velocity for each wheel drive based on the following relationship:

$$V = S \times VR$$

SR

where V is the velocity for the wheel drive, S is the wheel drive distance from the turning reference, SR is the reference distance, and VR is the vehicle velocity.

17 The method of claim 10 further comprising logic...

...turning reference and a vehicle velocity from the input device-

(e) means for determining a reference distance from the turning reference; (f) means for determining a wheel drive distance from the turning reference for each

wheel drive of the multi-wheel drive vehicle;

(g) means for determining a velocity for each wheel drive based on the vehicle

velocity, wheel drive distance, and reference distance; and

(h) means for outputting the determined velocity for each wheel

drive to each wheel drive.

20 The system of claim 19 wherein the means for...

...base dimension of the vehicle.

25 The system of claim 19 wherein the means for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance comprises means for determining the velocity for each wheel drive based on the following relationship:

$$V = S \times VR$$

SR

where V is the velocity for the wheel drive, S is the wheel drive distance from the turning reference, SR is the reference distance, and VR is the vehicle velocity.

26 The method of claim 19 further comprising the...

1/3, KWIC/2 (Item 1 from file: 654)

DIALOG(R) File 654:US Pat.Full.

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5839320 **IMAGE Available

Derwent Accession: 2002-558111

Utility

System and method for steering a multi-wheel drive vehicle

Inventor: Strothmann, Thomas, Wallenhorst, DE

Assignee: Invacare Corporation(02), Elyria, OH

Examiner: Black, Thomas G. (Art Unit: 361)

Assistant Examiner: Hernandez, Olga

Combined Principal Attorneys: Pejic, NenadCalfee, Halter & Griswold

| | Publication Number | Kind | Date | Application Number | Filing Date |
|--------------|-----------------------|------|----------|-----------------------|----------------|
| Main Patent | US 6807466 | A | 20041019 | US 2002279606 | 20021024 |
| Continuation | US 6526336 | A | | US 2001773793 | 20010201 |

Fulltext Word Count: 5041

Summary of the Invention:

...drive vehicle includes, for example, the step of determining a turning reference, vehicle velocity, and reference distance. The reference distance is the distance between the turning reference and a known reference position relative to the vehicle. The method further includes, for example, determining a wheel drive distance and velocity for each wheel drive. The wheel drive distance is the distance of each wheel drive from the turning reference. The velocity for a wheel drive is determined from the wheel drive distance, reference distance and vehicle velocity. Once the velocity for each wheel drive has been determined, it is...

Exemplary or Independent Claim(s):

...b) determining a reference distance from the turning reference based on the following relationship...

...where S^{sup}R is the reference distance, a is the turning reference,

and H is a wheel base dimension of the vehicle...

...c) determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle...

...d) determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance; and...

...e) outputting the determined velocity for each wheel drive to each wheel drive.

Non-exemplary or Dependent Claim(s):

...2) determining a reference distance from the turning reference based on the following relationship...

...where $S_{\text{sub}}R$ is a reference distance, a is the turning reference, and H is a wheel base dimension of the vehicle...

...3) determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle...

...4) determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance; and...

...5) outputting the determined velocity for each wheel drive to each wheel drive...

...e) means for determining a reference distance from the turning reference based on the following relationship...

...where $S_{\text{sub}}R$ is the reference distance, a is the turning reference, and H is a wheel base dimension of the vehicle...

...f) means for determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle...

...g) means for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance; and...

...h) means for outputting the determined velocity for each wheel drive to each wheel drive...

1/3, KWIC/3 (Item 2 from file: 654)

DIALOG(R) File 654:US Pat.Full.

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0005807552 **IMAGE Available

Derwent Accession: 2002-558111

System and method for steering a multi-wheel drive vehicle

Inventor: Strothmann, Thomas, INV

Correspondence Address: CALFEE HALTER & GRISWOLD, LLP, 800 SUPERIOR AVENUE SUITE 1400, CLEVELAND, OH, 44114, US

| | Publication Number | Kind | Date | Application Number | Filing Date |
|--------------|-----------------------|------|----------|-----------------------|----------------|
| Main Patent | US 20040186633 | A1 | 20040923 | US 2004815308 | 20040401 |
| Continuation | PENDING | | | US 2002279606 | 20021024 |

Continuation US 6526336

US 2001773793 20010201

Fulltext Word Count: 7148

Summary of the Invention:

...drive vehicle includes, for example, the step of determining a turning reference, vehicle velocity, and reference distance. The reference distance is the distance between the turning reference and a known reference position relative to the vehicle. The method further includes, for example, determining a wheel drive distance and velocity for each wheel drive. The wheel drive distance is the distance of each wheel drive from the turning reference. The velocity for a wheel drive is determined from the wheel drive distance, reference distance and vehicle velocity. Once the velocity for each wheel drive has been determined, it is...

Exemplary or Independent Claim(s):

- ...the steps of: (a) determining a turning reference and a vehicle velocity; (b) determining a reference distance from the turning reference; (c) determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle; (d) determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance; and (e) outputting the determined velocity for each wheel drive to each wheel drive...
- ...determining a turning reference and a vehicle velocity from the input device; (2) determining a reference distance from the turning reference; (3) determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle; (4) determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance; and (5) outputting the determined velocity for each wheel drive to each wheel drive...
- ...turning reference and a vehicle velocity from the input device; (e) means for determining a reference distance from the turning reference; (f) means for determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle; (g) means for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance; and (h) means for outputting the determined velocity for each wheel drive to each wheel drive...

Non-exemplary or Dependent Claim(s):

- ...16. The system of claim 10 wherein the logic for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance comprises logic for determining the velocity for each wheel drive based on the following relationship...
- ...25. The system of claim 19 wherein the means for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance comprises means for determining the velocity for each wheel drive based on the following relationship...

DIALOG(R)File 654:US Pat.Full.

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0005203212 **IMAGE Available

Derwent Accession: 2002-558111

System and method for steering a multi-wheel drive vehicle

Inventor: Thomas Strothmann, INV

Correspondence Address: CALFEE HALTER & GRISWOLD, LLP, 800 SUPERIOR
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| | Publication Number | Kind | Date | Application Number | Filing Date |
|--------------|-----------------------|------|----------|-----------------------|----------------|
| | ----- | -- | ----- | ----- | ----- |
| Main Patent | US 20030055539 | A1 | 20030320 | US 2002279606 | 20021024 |
| Continuation | PENDING | | | US 2001773793 | 20010201 |

Fulltext Word Count: 7220

Summary of the Invention:

...drive vehicle includes, for example, the step of determining a turning reference, vehicle velocity, and reference distance. The reference distance is the distance between the turning reference and a known reference position relative to the vehicle. The method further includes, for example, determining a wheel drive distance and velocity for each wheel drive. The wheel drive distance is the distance of each wheel drive from the turning reference. The velocity for a wheel drive is determined from the wheel drive distance, reference distance and vehicle velocity. Once the velocity for each wheel drive has been determined, it is...

Exemplary or Independent Claim(s):

...the steps of: (a) determining a turning reference and a vehicle velocity; (b) determining a reference distance from the turning reference; (c) determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle; (d) determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance; and (e) outputting the determined velocity for each wheel drive to each wheel drive...

...determining a turning reference and a vehicle velocity from the input device; (2) determining a reference distance from the turning reference; (3) determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle; (4) determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance; and (5) outputting the determined velocity for each wheel drive to each wheel drive...

...turning reference and a vehicle velocity from the input device; (e) means for determining a reference distance from the turning reference; (f) means for determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle; (g) means for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance; and (h) means for outputting the determined velocity for each wheel drive to each wheel drive...

Non-exemplary or Dependent Claim(s):

...16. The system of claim 10 wherein the logic for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance comprises logic for determining the velocity for each wheel drive based on the following relationship...

...25. The system of claim 19 wherein the means for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance comprises means for determining the velocity for each wheel drive based on the following relationship...

A 1/3,KWIC/5 (Item 4 from file: 654)

DIALOG(R) File 654:US Pat.Full.

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0005092781 **IMAGE Available

Derwent Accession: 2002-558111

System and method for steering a multi-wheel drive vehicle

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| | Publication Number | Kind | Date | Application Number | Filing Date |
|-------------|-----------------------|------|----------|-----------------------|----------------|
| Main Patent | US 20020147539 | A1 | 20021010 | US 2001773793 | 20010201 |

Fulltext Word Count: 7178

Summary of the Invention:

...drive vehicle includes, for example, the step of determining a turning reference, vehicle velocity, and reference distance. The reference distance is the distance between the turning reference and a known reference position relative to the vehicle. The method further includes, for example, determining a wheel drive distance and velocity for each wheel drive. The wheel drive distance is the distance of each wheel drive from the turning reference. The velocity for a wheel drive is determined from the wheel drive distance, reference distance and vehicle velocity. Once the velocity for each wheel drive has been determined, it is...

Exemplary or Independent Claim(s):

...the steps of: (a) determining a turning reference and a vehicle velocity; (b) determining a reference distance from the turning reference; (c) determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle; (d) determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance; and (e) outputting the determined velocity for each wheel drive to each wheel drive...

...determining a turning reference and a vehicle velocity from the input device; (2) determining a reference distance from the turning reference; (3) determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle; (4) determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference

distance ; and (5) outputting the determined velocity for each wheel drive to each wheel drive...

...turning reference and a vehicle velocity from the input device; (e) means for determining a reference distance from the turning reference; (f) means for determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle; (g) means for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance , and reference distance ; and (h) means for outputting the determined velocity for each wheel drive to each wheel drive...

Non-exemplary or Dependent Claim(s):

...16. The system of claim 10 wherein the logic for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance , and reference distance comprises logic for determining the velocity for each wheel drive based on the following relationship...

...25. The system of claim 19 wherein the means for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance , and reference distance comprises means for determining the velocity for each wheel drive based on the following relationship...

1/3,KWIC/6 (Item 5 from file: 654)

DIALOG(R) File 654:US Pat.Full.

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4832103 **IMAGE Available

Derwent Accession: 2002-558111

Utility

E/ System and method for steering a multi-wheel drive vehicle

Inventor: Strothmann, Thomas, Wallenhorst, DE

Assignee: Invacare Corp.(02), Elyria, OH

Invacare Corp (Code: 37783)

Examiner: Cuchlinski, Jr., William A. (Art Unit: 361)

Assistant Examiner: Hernandez, Olga

Combined Principal Attorneys: Pejic, NenadCalfee, Halter & Griswold LLP

| | Publication Number | Kind | Date | Application Number | Filing Date |
|-------------|-----------------------|------|----------|-----------------------|----------------|
| Main Patent | US 6526336 | A | 20030225 | US 2001773793 | 20010201 |

Fulltext Word Count: 4950

Summary of the Invention:

...drive vehicle includes, for example, the step of determining a turning reference, vehicle velocity, and reference distance . The reference distance is the distance between the turning reference and a known reference position relative to the vehicle. The method further includes, for example, determining a wheel drive distance and velocity for each wheel drive. The wheel drive distance is the distance of each wheel drive from the turning reference. The velocity for a wheel drive is determined from the wheel drive distance , reference distance and vehicle velocity. Once the velocity for each wheel drive has been determined, it is...

Exemplary or Independent Claim(s):

- ...b) determining a reference distance from the turning reference...
- ...c) determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle...
- ...d) determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance ; wherein this step comprises determining the velocity for each wheel drive based on the following relationship...
- ...where V is the velocity for the wheel drive, S is the wheel drive distance from the turning reference, $S_{sub}R$ is the reference distance, and $V_{sub}R$ is the vehicle velocity; and...
- ...e) outputting the determined velocity for each wheel drive to each wheel drive.

Non-exemplary or Dependent Claim(s):

- ...2) determining a reference distance from the turning reference...
- ...3) determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle...
- ...4) determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance ; wherein this logic comprises logic for determining the velocity for each wheel drive based on the following relationship...
- ...where V is the velocity for the wheel drive, S is the wheel drive distance from the turning reference, $S_{sub}R$ is the reference distance, and $V_{sub}R$ is the vehicle velocity; and...
- ...5) outputting the determined velocity for each wheel drive to each wheel drive...
- ...e) means for determining a reference distance from the turning reference...
- ...f) means for determining a wheel drive distance from the turning reference for each wheel drive of the multi-wheel drive vehicle...
- ...g) means for determining a velocity for each wheel drive based on the vehicle velocity, wheel drive distance, and reference distance ; wherein this means comprises means for determining the velocity for each wheel drive based on the following relationship...
- ...where V is the velocity for the wheel drive, S is the wheel drive distance from the turning reference, $S_{sub}R$ is the reference distance, and $V_{sub}R$ is the vehicle velocity; and...
- ...h) means for outputting the determined velocity for each wheel drive to each wheel drive...